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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WANG, GEORGE Y

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Handwritten mark

Office Action Summary

Application No.

09/740,760

Applicant(s)

DAVIS ET AL.

Examiner

George Y. Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-66 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 November 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The corrected or substitute drawings were received on 10 November 2002.

These drawings are accepted by Examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

3. Claims 25-26, 30-48, and 52-66 are rejected under 35 U.S.C. 102(e) as being anticipated by Ogle et al. (U.S. Patent No. 6,233,374, from hereinafter "Ogle").

4. Regarding claims 25, Ogle discloses an apparatus for sensing flow within a pipe (fig. 1, ref. 10) using acoustic and local pressure variation sensing arrays (fig. 1, ref. 5), such that the sensors are attached outside the pipe wall (fig. 1, ref. 13).

5. Regarding claims 47, Ogle discloses an apparatus for sensing flow within a pipe (fig. 1, ref. 10) using acoustic and local pressure variation sensing arrays (fig. 1, ref. 5), such that the sensors are attached outside the pipe wall (fig. 1, ref. 13). Furthermore, the acoustic sensing arrays sense acoustic signals for determining the speed of sound for fluid within the pipe while the local pressure variation sensors are capable of sensing signals relating to local pressure variations to determine a velocity for fluid within the pipe (col. 1, lines 5-11).

6. As to claims 26 and 48, Ogle further discloses optical power from a source connected to the apparatus producing signals sent to the sensing arrays.

7. As to claims 30 and 52, Ogle also teaches a pipe that is sufficiently compliant to sense acoustic and local pressure variation signals through the wall of the pipe (col. 1, lines 5-11).

8. Regarding claims 31-44 and 53-64, Ogle discloses an apparatus recited above with acoustic and local pressure variation sensing arrays having a plurality of sensors each having coiled optical fiber (fig. 1, ref. 13) wrapped a plurality of turns circumferentially around the pipe. The acoustic sensing arrays have Bragg gratings (fig. 1, ref. 18) and are spaced (fig. 1, ref. 11, 14) to sense acoustic signals for determining the speed of sound for fluid within the pipe. The local pressure variation sensors have evenly spaced apart with known distances (fig. 1, ref. 12) and are capable of sensing

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signals relating to local pressure variations to determine a velocity for fluid within the pipe (col. 1, lines 5-11).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 25-26, 30-48, and 52-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berthold et al. (U.S. Patent No. 5,845,033, from hereinafter "Berthold") in view of Kluth (U.S. Patent No. 5,804,713).

11. As to claim 25, Berthold discloses an apparatus for sensing flow within a pipe (fig. 1, ref. 10) using a flow velocity sensing device (fig. 1, ref. A) attached to the outside wall of the pipe to provide a velocity signal indicative of local pressure variations within the pipe.

However, the reference fails to specifically disclose an acoustic sensing device attached to the outside wall of the pipe to provide a signal indicative of the acoustic pressure variations within the pipe.

Kluth discloses an acoustic sensing device attached to the outside wall of the pipe to provide a signal indicative of the acoustic pressure variations within the pipe (col. 4, lines 44-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have also included an acoustic sensing device attached to the outside wall of the pipe to provide a signal indicative of the acoustic pressure variations within the pipe since one would be motivated by applications that include sand detection, pump, monitoring, and fluid monitoring (col. 4, lines 44-57). Furthermore, acoustic sensors are well known in the art and benefit from very high bandwidth while having low sensitivity, which make for highly efficient detection (col. 4, lines 44-57).

12. As to claim 31, 38, and 47, Berthold discloses an apparatus for sensing flow within a pipe (fig. 1, ref. 10) using a flow velocity sensing device (fig. 1, ref. A) attached to the outside wall of the pipe to provide a velocity signal indicative of local pressure variations within the pipe.

However, the reference fails to specifically disclose an acoustic sensing device attached to the outside wall of the pipe to provide a signal indicative of speed of sound within the pipe.

Kluth discloses an acoustic sensing device attached to the outside wall of the pipe to provide a signal indicative of the speed of sound within the pipe (col. 4, lines 44-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have also included an acoustic sensing device attached to the outside wall of the pipe to provide a signal indicative of the speed of sound within the pipe since one would be motivated by applications that include sand detection, pump, monitoring, and fluid monitoring (col. 4, lines 44-57). Furthermore, acoustic sensors are well known in the art and benefit from very high bandwidth while having low sensitivity, which make for highly efficient detection (col. 4, lines 44-57).

13. As to claims 26 and 48, Berthold discloses the apparatus as recited above with an optical source optically connected to provide optical power to the sensors (fig. 1, ref. 18).

14. Regarding claims 30, 32-37, 39-46 and 52-66, Berthold discloses the apparatus as recited above with fluid velocity sensors comprises a plurality of sensors (fig. 1, ref. A, B, C), which are evenly spaced (fig. 1, ref. "gauge length") to sense the fluid flow

(abstract), made up of optical fiber sensor that coil around the pipe (fig. 8), and separated by Bragg gratings (abstract).

However, the reference fails to specifically disclose an acoustic sensing device comprising a plurality of sensors, which are evenly spaced to sense the speed of sound, made up of optical fiber sensor that coil around the pipe, and separated by Bragg gratings.

Kluth discloses an acoustic sensing device comprising a plurality of sensors (fig. 3, ref. 2), which are evenly spaced to sense the speed of sound, made up of optical fiber sensors that coil (fig. 3, ref. 35) around the pipe.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate an acoustic sensing device comprising a plurality of sensors, which are evenly spaced to sense the speed of sound, made up of optical fiber sensor that coil around the pipe, and separated by Bragg gratings since one would be motivated by applications that include sand detection, pump, monitoring, and fluid monitoring (col. 4, lines 44-57). Moreover, acoustic sensors are well known in the art and benefit from very high bandwidth while having low sensitivity, which make for highly efficient detection (col. 4, lines 44-57). In addition, Bragg gratings are well known in the art and one of ordinary skill in the art would recognize its benefits in acoustic sensors and optical multiplexing as well (Berthold, *abstract*), especially in sensing shifts in wavelengths.

15. Claims 27-29 and 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berthold and Kluth, and in further view of Layton et al. (U.S. Patent No. 5,363,342, from hereinafter "Layton").

Berthold and Kluth disclose the apparatus as recited above, however, the references fail to specifically disclose a housing, which encloses the sensing arrays and forms a pressure vessel having an annular region between housing and pipe.

Layton discloses a housing, which encloses the sensing arrays and forms a pressure vessel having an annular region between housing and pipe (fig. 3, ref. 34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a housing, which encloses the sensing arrays and forms a pressure vessel having an annular region between housing and pipe since one would be motivated to not only protect the sensor coils around the pipe, but to also increase the framework for which the sensors operate (col. 4, lines 33-45).

Furthermore, a housing support forms an air gap (fig. 46b) around the pipe, such that the scale factor of acoustic sensitivity would increase (col. 6, lines 51-60) and provide greater compliance to detect acoustic and pressure variations and impedance mismatches (col. 5, lines 6-17).

Response to Arguments

16. Applicant's arguments with respect to claims 1-24 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 703-305-7242. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 703-305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

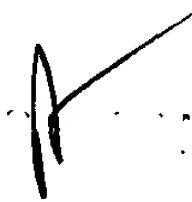
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

gw
February 21, 2003


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